

REMARKS

Overview of the Office Action

Claims 1, 2, 4, 6, 8-11, and 14 have been rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 6,005,717 (“Neuberger”) in view of U.S. Patent No. 6,950,573 (“Ota”), and further in view of U.S. Patent No. 6,771,686 (“Ullman”).

Claims 12 and 13 have been rejected under 35 U.S.C. §103(a) as unpatentable over Neuberger in view of Ota, and further in view of U.S. Patent No. 5,386,431 to Tulip (“Tulip”).

Status of the claims

Claims 1 and 8 have been amended.

Claim 15 is added.

Claims 3 and 7 have been previously canceled.

Claim 5 has been previously withdrawn.

Claims 1-2, 4, 6, and 8-14 are pending.

Summary of subject matter disclosed in the specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

The coupling-in device couples-in light from a plurality of light sources into an end of an optical waveguide. All of the light is coupled in via a coupling-in area that constitutes a single curved region that covers the entire end of the optical waveguide. The single curved region is curved in a focusing fashion, and the coupling-in device has a plurality of focusing optics for the

light from the various light sources. Further, the focusing optics and the coupling-in area are produced in one piece, and the coupling-in area is surrounded by a frame in which the focusing optics are integrated.

An advantage of the disclosed device is that free space exists between the focusing optics and the coupling-in area so that the focusing optics can have an area curved convexly inward in the direction of the coupling-in area and the coupling-in area can be formed in a circle-segment-like or sphere-segment-like configuration in the direction of the focusing optics (see Fig. 1).

Claims 1, 2, 4, 6, 8-11, and 14 are allowable over Neuberger, Ota, and Ullman under 35 U.S.C. § 103(a)

The Office Action states that the combination of Neuberger, Ota, and Ullman teaches all of the elements recited in Applicant's claims.

Independent claim 1 has been amended to recite, inter alia, a coupling-in device for light from a plurality of light sources into an end of an optical waveguide, “wherein the coupling-in area, the frame, and the focusing optics together define a cavity between the coupling-in area and the focusing optics, and the coupling-in area is an inner surface adjoining the cavity”. Support for the claim amendment can be found in Figs. 1 and 2 of the published specification.

Neuberger, Ota, and Ullman, whether taken alone or in combination, fail to teach or suggest “wherein the coupling-in device has a plurality of focusing optics for the light from the various light sources, the focusing optics and the coupling-in area being produced in one single piece, the coupling-in area being surrounded by a frame in which the focusing optics are integrated, and wherein the coupling-in area, the frame, and the focusing optics together define a cavity between

the coupling-in area and the focusing optics, and the coupling-in area is an inner surface adjoining the cavity”, as recited in Applicant’s amended independent claim 1.

The Examiner concedes in the Office Action that Neuberger does not teach or suggest a device wherein all of the light is coupled in via a coupling-in area that constitutes a single cured region that cover the entire end of the optical waveguide. Further, and in contrast to Applicants’ amended independent claim 1, Neuberger also does not teach or suggest that the focusing optics and the coupling-in area are produced in one piece, and that the coupling-in area is surrounded by a frame in which the focusing optics are integrated.

The Examiner cites Fig. 1 and col. 2, lines 32-40 of Ota as teaching a device wherein all of the light is coupled in via a coupling-in area that constitutes a single cured region that cover the entire end of the optical waveguide. However, Ota does not teach or suggest that the focusing optics and the coupling-in area are produced in one piece, and that the coupling-in area is surrounded by a frame in which the focusing optics are integrated, as recited in Applicants’ amended independent claim 1.

Further, the lens array disclosed by Neuberger collimates along the slow axis and the lens disclosed by Ota collects light beams in the slow axis direction. Moreover, combining the references does not result a device where the coupling-in area is surrounded by a frame in which the focusing optics are integrated, as recited in Applicants’ amended independent claim 1. Instead, combining the devices of Neuberger and Ota would result in forming the curve shaped end of the fiber below 405 (see Neuberger Fig. 4b) as a single curved region, which would be a single large element.

The Examiner cites Ullman as teaching that correction optics may be formed in a number of ways to include one piece or monolithically to eliminate nonconformities to improve focus quality.

The Examiner states that Ullman is evidence that one skilled in the art would find the reason, suggestion, or motivation to add one piece or monolithically formed optical compensation unit to eliminate nonconformities to improve focus quality.

Ullman discloses a laser diode arrangement that includes diode laser bars with emitters, correction optics, and a focusing lens (see Fig. 13 of Ullman). The individual emitters deliver a laser beam, which has divergence, both in the fast axis and in the slow axis. To eliminate this beam divergence, Ullman teaches using a correction optics segment that includes several individual lenses. A cylinder lens surface on the entry surface of each individual lens is active in the fast axis and a cylinder lens surface on the exit surface of each individual lens is active in the slow axis.

The Examiner specifically cites col. 2, lines 40-52 of Ullman as teaching that the focusing optics and the coupling-in area are produced in one piece. However, this section of Ullman cited by the Examiner states only that correction optics for fast axis and slow axis collimators may be made as a single lens body. Although Ullman describes correction optics with two optical elements produced in one piece, Ullman does not teach or suggest that the focusing lens, which is analogous to the focusing element in Applicants' recited invention, can be produced in one piece with other optical elements, as recited in Applicants' amended independent claim 1. Furthermore, Ullman does not teach or suggest that the correction optics or parts of the correction optics or the focusing lens are integrated into a frame surrounding another optical element, also as recited in Applicants' amended independent claim 1 (i.e., the coupling-in area being surrounded by a frame in which the focusing optics are integrated).

In response to Applicant's arguments, the Examiner asserts on page 6 of the Office Action that the modification of Neuberger in view of Ota with the invention of Ullman would obviously necessitate some sort of frame (part of the one piece or monolithically formed optical unit) to

support the integrated focusing optics in proper alignment with the single curved region of Ota, otherwise the device fall apart. The Examiner considers the formation of some sort of frame to hold the optical components together in proper alignment to be an obvious result of successfully implementing a modification of Neuberger in view of Ota into a monolithically formed optical compensation unit per the teachings of Ullman. Applicant disagrees.

Referring to the attached figure, combining the lens array (404) disclosed by Neuberger with the lens (60) disclosed by Ota, and applying the teaching of Ullman would result in one single lens which consists of a massive piece and has one surface with a plurality of curved regions and another surface with one single curved region. A frame would not be necessary in order to combine the lens array (404) of Neuberger and the lens (60) of Ota into one single piece and, therefore, a person skilled in the art would not be motivated to use a frame. Moreover, as none of the cited references teaches using a frame, it is not obvious for a person skilled in the art to use a frame in order to successfully implement a modification of Neuberger in view of Ota into a monolithically formed optical compensation unit per the teachings of Ullman.

Therefore, Neuberger, Ota, and Ullman, whether taken alone or in combination, fail to teach or suggest “wherein the coupling-in device has a plurality of focusing optics for the light from the various light sources, the focusing optics and the coupling-in area being produced in one single piece, the coupling-in area being surrounded by a frame in which the focusing optics are integrated”, as recited in Applicant’s amended independent claim 1.

The Examiner cites the curved area below (405) of Neuberger to correspond to Applicant’s coupling-area. However, the curved area below (405) of Neuberger is clearly an external surface. In contrast to Neuberger, Applicants’ coupling-in area is an inner surface that adjoins a cavity. Further, because Neuberger fails to teach or suggest a frame with integrated focusing optics,

Neuberger also fails to teach or suggest the coupling-in area, the frame, and the focusing optics together defining a cavity between the coupling-in area and the focusing optics.

Therefore, Neuberger fails to teach or suggest, “wherein the coupling-in area, the frame, and the focusing optics together define a cavity between the coupling-in area and the focusing optics, and the coupling-in area is an inner surface adjoining the cavity”, as recited in Applicant’s amended independent claim 1. Ota and Ullman both also fail to teach or suggest these limitations.

In view of the foregoing, it is respectfully submitted that Neuberger, Ota, and Ullman, whether taken alone or in combination, do not teach or suggest the subject matter recited in Applicant’s amended independent claim 1. Accordingly, claim 1 is patentable thereover under 35 U.S.C. §103(a).

Dependent claims

Claims 2, 4, 6, 8-15, which depend directly or indirectly from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Neuberger, Ota, and Ullman for at least those reasons discussed above with respect to independent claim 1.

New Claim

New claim 15 recites that “the coupling-in area, the frame, and the focusing optics define a continuous perimeter of the cavity”. Support for this limitation is found in original Figs. 1 and 2.

The prior art of record fails to disclose such an arrangement. Accordingly, claim 15 should be allowable for at least these additional reasons.

Conclusion


In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of all rejections, and allowance of all pending claims in due course.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,

COHEN PONTANI LIEBERMAN & PAVANE LLP

By



Alfred W. Froebrich

Reg. No. 38,887

551 Fifth Avenue, Suite 1210

New York, New York 10176

(212) 687-2770

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